

CLAIMS

1. A method for achieving a desired value for the magnitude of compression when compressing the information contained in a digitized fingerprint image using a lossy compression method that includes use of a compression parameter whose value may be varied to adjust the amount of compression actually achieved, the method comprising:

selecting a first value for the compression parameter;

performing a first compression of the information contained in a digitized fingerprint image using the first value for the compression parameter and using the lossy compression method, thereby producing a first set of compressed information;

computing a first value for the magnitude of compression from the quantity of information contained in the digitized fingerprint image and the quantity of information contained in the first set of compressed information;

forming a first pair of values which first pair includes the first value for the magnitude of compression and the first value for the compression parameter;

interpolating, using the first pair of values, a second pair of values, and a first new pair of values which first new pair includes the desired value for the magnitude of compression and an as yet unknown first new value for the compression parameter to determine a value for this first new value for the compression parameter by computing its value from the remaining five values; and

performing a first new compression of the fingerprint image information using this first new value for the compression parameter to produce a first new set of compressed information;

whereby the first new set of compressed information is compressed close to the desired value for the magnitude of compression.

2. A method in accordance with claim 1 further comprising:

as a preliminary step, selecting a second value for the compression parameter and a second value for the magnitude of compression such that the lossy compression method, when applied using this second value for the compression parameter to compress large numbers of digitized fingerprint images, achieves a magnitude of compression generally in accord with this second value for the magnitude of compression; and

forming the second pair of values which second pair includes the second value for the magnitude of compression as well as this second value for the compression parameter.

3. A method in accordance with claim 2 wherein the lossy compression method is WSQ and wherein the second value for the magnitude of compression, when expressed as a compression ratio, falls within the range of 1 to 2.

4. A method in accordance with claim 3 wherein the second value for the compression parameter is selected to be about equal to the second value for magnitude of compression.

5. A method in accordance with claim 2 wherein the lossy compression method is WSQ and wherein the second value for the magnitude of compression, when expressed as a compression ratio, falls within the range of 1.3 to 1.9.

6. A method in accordance with claim 5 wherein the second value for the compression parameter is selected to be about equal to the second value for the magnitude of compression.

7. A method in accordance with claim 2 wherein the lossy compression method is WSQ and wherein the second value for the magnitude of compression, when expressed as a compression ratio, is close to 1.6.

8. A method in accordance with claim 7 wherein the second value for the compression parameter is selected to be about equal to the second value for the magnitude of compression.

9. A method in accordance with claim 2 which further comprises:
computing a first new value for the magnitude of compression from the quantity of information contained in the digitized fingerprint image and the quantity of information contained in the first new set of compressed information;

forming a first new pair of values which first new pair includes the first new value for the magnitude of compression and the first new value for the compression parameter;

interpolating, using the first pair of values, the first new pair of values, and a second new pair of values which second new pair includes the desired magnitude of compression and an as yet unknown second new value for the compression parameter, to determine a value for this second new value for the compression parameter computed from the other five values;
and

performing a second new compression of the fingerprint image information using this second new value for the compression parameter, to produce a second new set of compressed information.

10. A method in accordance with claim 9, wherein the three final steps defined by claim 9 are only carried out if the first new value for the magnitude of compression is unacceptably far from the desired value for the magnitude of compression.

11. A method in accordance with claim 10 comprising:

computing a second new value for the magnitude of compression from the quantity of information contained in the digitized fingerprint image and the quantity of information contained in the second new set of compressed information; and

if the second new value for the magnitude of compression is unacceptably far from the desired value for the magnitude of compression, performing the following additional steps:

forming a second new pair of values which second new pair includes the second new value for the magnitude of compression and the second new value for the compression parameter;

interpolating, using the first new pair of values, the second new pair of values, and a third new pair of values which third new pair includes the desired magnitude of compression and an as yet unknown second new value for the compression parameter, to determine a value for this third new value for the compression parameter computed from the other five values in the three pairs; and

performing a second new compression of the fingerprint image information using this second new value for the compression parameter, to produce a third new set of compressed information.

12. A method in accordance with claim 1 which further comprises:

selecting a second value for the compression parameter;

performing a second compression of the same information using the second value for the compression parameter, thereby producing a second set of compressed information;

computing a second value for the magnitude of compression from the quantity of information contained in the same information and the quantity of information contained in the second set of compressed information; and

forming the second pair of values which second pair includes the second value for the magnitude of compression along with the second value for the compression parameter.

13. A method in accordance with claim 12 which further comprises:

computing a first new value for the magnitude of compression from the quantity of

information contained in the digitized fingerprint image and the quantity of information contained in the first new set of compressed information;

forming a first new pair of values which first new pair includes the first new value for the magnitude of compression and the first new value for the compression parameter;

interpolating, using either the first or the second pair of values, the first new pair of values, and a second new pair of values which second new pair includes the desired magnitude of compression and an as yet unknown second new value for the compression parameter, to determine a value for this second new value for the compression parameter computed from the other five values; and

performing a second new compression of the fingerprint image information using this second new value for the compression parameter, to produce a second new set of compressed information.

14. A method in accordance with claim 13, wherein the three final steps defined by claim 9 are only carried out if the first new value for the magnitude of compression is unacceptably far from the desired value for the magnitude of compression.

15. A method in accordance with claim 14 comprising:

computing a second new value for the magnitude of compression from the quantity of information contained in the digitized fingerprint image and the quantity of information contained in the second new set of compressed information; and

if the second new value for the magnitude of compression is unacceptably far from the desired value for the magnitude of compression, performing the following additional steps:

forming a second new pair of values which second new pair includes the second new value for the magnitude of compression and the second new value for the compression parameter;

interpolating, using the first new pair of values, the second new pair of values, and a third new pair of values which third new pair includes the desired magnitude of compression and an as yet unknown second new value for the compression parameter, to determine a value for this third new value for the compression parameter computed from the other five values in the three pairs; and

performing a second new compression of the fingerprint image information using this second new value for the compression parameter, to produce a third new set of compressed information.

16. A system that can store, retrieve, transmit, and receive digitized fingerprint images and also compress and decompress such images, achieving a desired value for the magnitude of compression when compressing fingerprint images using a lossy compression method that includes use of a compression parameter whose value may be varied to adjust the amount of compression actually achieved, the system comprising:

a programmed computer having a memory where fingerprint image information may be stored along with information identifying the individuals whose fingerprint images are stored in the memory, and also having a communications facility that can transmit and receive fingerprint image information to and from remote sites;

compression routines installed on the programmed computer for carrying out at least one lossy method of compression that can compress digitized fingerprint images to facilitate their storage or transmission or both and that respond to adjustment of an incoming compression parameter argument by varying the degree of compression;

decompression routines installed on the programmed computer for uncompressing digitized fingerprint images; and

compression control routines installed on the programmed computer that contain instructions which call upon the compression routines and carry out steps comprising:

selecting a first value for the compression parameter;

calling upon the compression routines to perform a first compression of the information contained in a digitized fingerprint image using the first value for the compression parameter, thereby producing a first set of compressed information;

computing a first value for the magnitude of compression from the quantity of information contained in the digitized fingerprint image and the quantity of information contained in the first set of compressed information;

forming a first pair of values which first new pair includes the first value for the magnitude of compression and the first value for the compression parameter;

interpolating, using the first pair of values, a second pair of values, and a first new pair of values which first new pair includes the desired value for the magnitude of compression and an as yet unknown first new value for the compression parameter to determine a value for this first new value for the compression parameter by computing its value from the remaining five values; and

calling upon the compression routines to perform a first new compression of the fingerprint image information using this first new value for the compression parameter to produce a first new set of compressed information;

whereby the first new set of compressed information is compressed close to the desired value for the magnitude of compression.

17. A system in accordance with claim 16 wherein the steps carried out by the compression control routines further comprise:

as a preliminary step, selecting a second value for the compression parameter and a second value for the magnitude of compression such that the lossy compression method, when applied using this second value for the compression parameter to compress large numbers of digitized fingerprint images, achieves a magnitude of compression generally in accord with this second value for the magnitude of compression; and

forming the second pair of values which second pair includes this second value for the magnitude of compression as well as this second value for the compression parameter.

18. A system in accordance with claim 17 wherein the lossy compression routines implement the WSQ compression method and wherein the second value for the magnitude of compression, when expressed as a compression ratio, falls within the range of 1 to 2.

19. A system in accordance with claim 18 wherein the second value for the compression parameter is selected to be about equal to the second value for magnitude of compression.

20. A system in accordance with claim 17 wherein the lossy compression method is WSQ and wherein the second value for the magnitude of compression, when expressed as a compression ratio, falls within the range of 1.3 to 1.9.

21. A system in accordance with claim 20 wherein the second value for the compression parameter is selected to be about equal to the second value for the magnitude of compression.

22. A system in accordance with claim 17 wherein the lossy compression routines implement the WSQ method and wherein the second value for the magnitude of compression, when expressed as a compression ratio, is close to 1.6.

23. A system in accordance with claim 22 wherein the second value for the compression parameter is selected to be about equal to the second value for the magnitude of compression.

24. A system in accordance with claim 17 wherein the steps carried out by the compression control routines further comprise:

computing a first new value for the magnitude of compression from the quantity of information contained in the digitized fingerprint image and the quantity of information contained in the first new set of compressed information;

forming a first new pair of values which first new pair includes the first new value for the magnitude of compression and the first new value for the compression parameter;

interpolating, using the first pair of values, the first new pair of values, and a second new pair of values which second new pair includes the desired magnitude of compression and an as yet unknown second new value for the compression parameter, to determine a value for this second new value for the compression parameter computed from the other five values; and

performing a second new compression of the fingerprint image information using this second new value for the compression parameter, to produce a second new set of compressed information.

25. A system in accordance with claim 24, wherein the three final steps defined by claim 24 are only carried out if the first new value for the magnitude of compression is unacceptably far from the desired value for the magnitude of compression.

26. A system in accordance with claim 25 wherein the steps carried out by the compression control routines further comprise:

computing a second new value for the magnitude of compression from the quantity of information contained in the digitized fingerprint image and the quantity of information contained in the second new set of compressed information; and

if the second new value for the magnitude of compression is unacceptably far from the desired value for the magnitude of compression, performing the following additional steps:

forming a second new pair of values which second new pair includes the second new value for the magnitude of compression and the second new value for the compression parameter;

interpolating, using the first new pair of values, the second new pair of values, and a third new pair of values which third new pair includes the desired magnitude of compression and an as yet unknown second new value for the compression parameter, to determine a value

for this third new value for the compression parameter computed from the other five values in the three pairs; and

calling upon the compression routines to perform a second new compression of the fingerprint image information using this second new value for the compression parameter, to produce a third new set of compressed information.

27. A system in accordance with claim 16 wherein the steps carried out by the compression control routines further comprise:

performing a second compression of the same information using the second value of the compression parameter, thereby producing a second set of compressed information;

computing a second magnitude of compression from the quantity of information contained in the same information and the quantity of information contained in the second set of compressed information; and

forming the second pair of values which second pair includes the second magnitude of compression along with the second value of the compression parameter.

28. A system in accordance with claim 17 wherein the steps carried out by the compression control routines further comprise:

computing a first new value for the magnitude of compression from the quantity of information contained in the digitized fingerprint image and the quantity of information contained in the first new set of compressed information;

forming a first new pair of values which first pair includes the first new value for the magnitude of compression and the first new value for the compression parameter;

interpolating, using the first or the second pair of values, the first new pair of values, and a second new pair of values which second new pair includes the desired magnitude of compression and an as yet unknown second new value for the compression parameter, to determine a value for this second new value for the compression parameter computed from the other five values; and

performing a second new compression of the fingerprint image information using this second new value for the compression parameter, to produce a second new set of compressed information.

29. A system in accordance with claim 28, wherein the three final steps defined by claim 28 are only carried out if the first new value for the magnitude of compression is unacceptably far from the desired value for the magnitude of compression.

30. A system in accordance with claim 29 wherein the steps carried out by the compression control routines comprise:

computing a second new value for the magnitude of compression from the quantity of information contained in the digitized fingerprint image and the quantity of information contained in the second new set of compressed information; and

if the second new value for the magnitude of compression is unacceptably far from the desired value for the magnitude of compression, performing the following additional steps:

forming a second new pair of values which second new pair includes the second new value for the magnitude of compression and the second new value for the compression parameter;

interpolating, using the first new pair of values, the second new pair of values, and a third new pair of values which third new pair includes the desired magnitude of compression and an as yet unknown second new value for the compression parameter, to determine a value for this third new value for the compression parameter computed from the other five values in the three pairs; and

calling upon the compression routines to perform a second new compression of the fingerprint image information using this second new value for the compression parameter, to produce a third new set of compressed information.